

We claim:

1. An internal combustion engine containing a combustion chamber, comprising:

an engine body including an engine cylinder, a cylinder head forming an inner face of the combustion chamber and at least one intake port formed in the cylinder head for directing intake air into the combustion chamber, the intake air undergoing a swirling effect during operation, said swirling effect resulting in a swirl ratio SR in the range of .5 – 2.5;

a piston positioned for reciprocal movement in said engine cylinder between a bottom dead center position and a top dead center position, said piston including a piston crown including a top face facing the combustion chamber, said piston crown containing a piston bowl formed by an outwardly opening cavity, said piston bowl including a projecting portion having a distal end and an inner bowl floor section extending inwardly at an inner bowl floor angle α in the range of 16 – 40 degrees from a plane perpendicular to an axis of reciprocation of the piston, said piston bowl further including an outwardly flared outer bowl section having a concave curvilinear shape in cross section wherein said concave curvilinear shape of said outwardly flared outer bowl section has a radius of curvature R_1 in the range of 8 – 20 mm;

an injector mounted on the engine body adjacent said projecting portion of said piston bowl to inject fuel into the combustion chamber, said injector including a plurality of orifices arranged to form a spray plume, each of said plurality of orifices having a central axis oriented at a spray angle β from a plane perpendicular to the axis of reciprocation of the piston sufficient to cause the spray plume to impinge on said inner bowl floor section, each of said plurality of orifices including an outlet opening having a center, said center being a distance L_1 from said distal end of said projecting portion, said distance L_1 being in the range of .5 – 4 mm.